

Serial No. 10/717,988
60130-1967; 01MRA0218AMENDMENTIN THE SPECIFICATION:

Please amend paragraph 24 as follows:

Figure 1 schematically illustrates a single lift bare cable window regulator cable assembly 10. An upper pulley wheel 20 is pivotally mounted via an upper pulley wheel pivot 22 onto a rigid member 24. A lower pulley wheel 26 and a cable drum wheel 30 are also pivotally mounted via a lower pulley wheel pivot 28 and a cable drum pivot 32, respectively, onto the rigid member 24. A cable arrangement 34 is wound around the wheels 20, 26, and 30, defining cable runs 36, 38 and 40. The cable run 40 includes a cursor 42 attached, either directly or indirectly, to the bottom of a window glass (not shown). The cable run 40 is therefore defined by a cable run 40A (between the upper pulley wheel 20 and the cursor 42) and a cable run 40B (between the lower pulley wheel 26 and the cursor 42). Rotation of the cable drum wheel 30 in a clockwise direction lowers the cursor 42, and rotation of the cable drum wheel 30 in a counter-clockwise direction raises the cursor 42.

Please amend paragraph 25 as follows:

Typically, the cable arrangement includes two separate cables 34A and 34B. One end of the cable 34A is attached to the cursor 42, and the other end of cable 34A is attached to the cable drum wheel 30. The end portion of the cable 34A proximate to the cable drum wheel 30 is typically wound around the cable drum wheel 30 several times to allow for lifting and lowering of the cursor 42. In a similar manner, one end of the cable 34B is attached to the cursor 42, and the other end of the cable 34B is attached to the cable drum wheel 30. Again, the end of the cable 34B proximate to the cable drum wheel 30 is wound around the cable drum wheel 30 several times to allow for lifting and lowering of the cursor 42. The cable 34A acts as a lifting cable, i.e., it acts in tension to lift the window glass, whereas the cable 34B acts as a lowering cable, i.e., it acts in tension to lower the window glass.

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Please amend paragraph 26 as follows:

Typically, the components shown in Figure 1 are a subassembly and are mounted into the door via fixing members, such as screws, bolts, rivets and the like, that pass through the fixing holes 44 and corresponding holes in the door. The window glass can then be fitted in the door.

Please amend paragraph 27 as follows:

The upper pulley wheel 20 and the lower pulley wheel 26 each include a circumferential groove that receives within which the cable. The cable drum wheel 30 includes a helical groove in its peripheral surface. The helical groove allows the cable 34A to wind onto and wind off of the cable drum wheel 30 as the window glass is raised and lowered, respectively. A separate part of the helical groove allows for the lowering cable 34B to wind onto and wind off of the cable drum wheel 30 as the window glass is lowered and raised, respectively.

Please amend paragraph 28 as follows:

When the components of Figure 1 are provided as a subassembly, the cable must remain sufficiently taut to ensure it does not come off any of the wheels 20, 26, and 30. Thus, the pulley wheel pivots 22, 2628, and 32 must be fixed in the position shown. The rigid member 24 is typically made from sheet steel as a pressing, and the sheet thickness is approximately 0.6mm thick. Once the subassembly is assembled into the door and secured firmly via the fixing holes 44, certain regions of the rigid member/cable run 36, such as the region shown as cross hatching at A, become redundant since the wheel pivots 22, 2628, and 32 for the wheels 20, 26, and 30 are held in their spaced apart relationship by the rigidity of the door.

Please amend paragraph 29 as follows:

Figure 2 shows a single lift Bowden cable assembly 111, wherein the components which fulfill the same function as those of the regulator cable assembly 10 are labeled with reference numerals 100 greater. Instead of a T-shaped rigid member 24, a rigid member 150 is provided onto which an upper pulley wheel pivot 122 and a lower wheel pivot 128 are secured, ensuring that the upper and lower pulley wheels 120 and 126 are maintained in the spaced apart relationship.

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Please amend paragraph 31 as follows:

The Bowden cable sheaths 154 are flexible and typically include a tightly helically wound metal strip that form a tube. The inside of the tube is lined with a friction reducing material, such as PTFE, and the outside of the tube is protected by a waterproof material, such as a plastics material. The ends of the Bowden cable sheath 154 engage with fittings 156 of the rigid member 150 and the separate plate 152. The fittings 156 are sufficiently strong to support a load equivalent to the maximum tensile load in the cable (since the fittings 156 react against this load). Furthermore, the tensile load in the cable is reacted as an exact equivalent compressive load (ignoring any friction effects) in the Bowden cable. The Bowden cable is sufficiently strong to support a compressive load equivalent to the maximum tensile load in the cable. Therefore, an elaborate, and therefore expensive, tightly helically wound metal strip, friction-reducing lining and waterproof outer material is required.

Please amend paragraph 32 as follows:

The Bowden cable sheath 154 is flexible, and the ends of a particular Bowden cable sheath can move relative to each other. That is, by bending the Bowden cable sheath 154 into a U-shape, the ends of the Bowden cable sheath 154 approach each other. By straightening out the Bowden cable sheath 154, the ends of the sheath Bowden cable 154 move apart. Therefore, the straight line distance between the ends of the Bowden cable sheath 154 can be vary. In certain installations, this feature can be used to move the separate plate 152 closer to the rigid member 150 to avoid obstructions when assembling the window-regulators lift Bowden cable assembly 111 into its respective door. Once the obstruction has been avoided, the separate plate 152 and the rigid member 150 can be returned to their correct relative position and secured to the door. Therefore, the use of Bowden cables assists in assembling window regulator cable assemblies into doors and ensure that the cables remain in the correct grooves in the various pulley wheels.

Please amend paragraph 33 as follows:

The prior art system shown in Figure 1 includes redundant material, and the prior art shown in Figure 2 includes an expensive Bowden cable sheath 154 that requires relatively strong fittings on the rigid member 124 and the separate plate 152.

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Please amend paragraph 34 as follows:

Figure 3 shows a window regulator cable assembly 212 according to one embodiment of the present invention. The components fulfill substantially the same function as those shown in Figure 1 and are labeled with reference numerals 200 greater. The upper and lower pulley wheels 220 and 226 are mounted on a rigid member 250 similar to the rigid member 150 of Figure 2. Similarly, the cable drum wheel 230 is mounted on a separate plate 252 similar to the separate plate 152 of Figure 2.

Please amend paragraph 35 as follows:

Figure 3 further schematically shows a rigid frame 270 upon which the rigid member 250 and the separate plate 252 are secured via the respective fixing holes 244. The rigid frame 270 can be a door. Once the regulator cable assembly 212 is secured to the deerrigid frame 270, the rigidity of the deerrigid frame 270 ensures that the rigid member 250 is correctly spaced apart from the separate plate 252.

Please amend paragraph 36 as follows:

The cable run 236 is surrounded by a semi-rigid tube 260. In one example, the semi-rigid tube is made from an extruded plastic material, such as PVC or polyethylene. The semi-rigid tube 260 has a longitudinal slit 262 (shown in Figure 6). A semi-rigid tube 261 identical to the semi-rigid tube 260 surrounds the cable run 238. The internal diameter of the semi-rigid tube 260 provides a running fit on thea cable 234 having a lift cable 234A and a lowering cable 234B. In this example, the internal diameter of the semi-rigid tube 260 is approximately 4mm, and the external diameter of the scmi-rigid tube 260 is approximatly 6mm. The ends of the semi-rigid tube 260 abut the fittings 266.

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Please amend paragraph 37 as follows:

The semi-rigid tubes 260 and 261 temporarily space the cable drum wheel 230 from the upper and lower wheels 220 and 226, respectively. Thus, it is possible to manufacture the regulator cable assembly 212, i.e., all of the components shown in Figure 3 other than the door rigid frame 270, as a subassembly. This subassembly can be transported and fitted to the door rigid frame 270, and the semi-rigid tubes 260 and 261 ensure that the cable does not come out of any of the cable grooves in any of the wheels 220, 226, and 230. Once the subassembly is fitted to the door rigid frame 270, the semi-rigid tubes 260 and 261 become redundant since the rigid member 250 is kept in its spaced apart relationship relative to the separate plate 252 by virtue of the rigidity of the door rigid frame 270.

Please amend paragraph 38 as follows:

Figures 1, 2 and 3 provide a subassembly which ensures that the cable is under tension and does not become disengaged from the cable drum or the pulley wheels before assembly onto a door or the like. The redundant material shown cross hatched as A of Figure 1 is not present in Figure 3, allowing the embodiment shown in Figure 3 to be lighter than the embodiment shown in Figure 1. The expensive Bowden cable sheaths 154 of Figure 2 are also not present in Figure 3. The semi-rigid tubes 260 and 261 of Figure 3 are less expensive to produce. Additionally, the fittings 156 of Figure 2 must be sufficiently strong to react against the full cable tension load. The fittings 266 of Figure 3 are only required to be strong enough to support "transportation" loads before the assembly of the cable assembly onto the door, and are significantly less than "in service" loads that occur when the cable assembly is mounted on the door rigid frame 270 and the associated vehicle is in use.

Please amend paragraph 39 as follows:

The semi-rigid tubes 260 and 261 each have a longitudinal slit 262, allowing the semi-rigid tubes 260 and 261 to be removed from their associated cable runs 236 and 238 once the subassembly has been fitted to the door rigid frame 270. Additionally, depending on the assembly method used, the longitudinal slit 262 can facilitate assembly of the semi-rigid tubes 260 and 261 onto the cable runs 236 and 238 during manufacture of the subassembly and before transportation of the subassembly.

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Please amend paragraph 40 as follows:

In another embodiment, the longitudinal slit 262 is not required and the semi-rigid tubes 260 and 261 remain on their associated cable runs 236 and 238 in use. The semi-rigid tubes 260 and 261 are effectively redundant (except when two cable paths cross and when using bent tubes) since the semi-rigid tubes 236260 and 238261 are not required to maintain tension in the cable arrangement. To reduce costs, the semi-rigid tubes 236260 and 238261 are made out of an extruded plastic material.

Please amend paragraph 41 as follows:

The semi-rigid tubes 260 and 261 should be sufficiently rigid in a longitudinal sense to cope with the "transportation" loads. In most embodiments, the semi-rigid tubes 236260 and 238261 are semi-rigid in a lateral sense. Therefore, the ends of the semi-rigid tubes 236260 and 238261 remain at substantially the same distance from each other, unlike the ends of the prior art Bowden cable sheaths.

Please amend paragraph 42 as follows:

Figure 4 shows a dual lift cable assembly 313 including components that fulfill substantially the same function as those of the regulator cable assembly 10 and are labeled 300 greater. In this embodiment, there are two rigid members 350 and 351 spaced apart laterally. The rigid member 351 includes a second upper pulley wheel 321 and a second lower pulley wheel 327. The cable run 390 includes a cable run 391 extending from thea first upper pulley wheel 320 to the cursor 342A and a cable run 392 extending from the cursor 342A to thea first lower pulley whcc1 326. The cable run 394 includes a cable run 395 from the cursor 342B to the second upper pulley wheel 321 and a cable run 396 from the cursor 342B to the second lower pulley wheel 327.

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Please amend paragraph 43 as follows:

The cable arrangement includes three cables 397, 398 and 399. The lifting cable 397 is similar to the lift cable 234A, and one end of the lifting cable 397 is connected to the cursor 342A, and the other end of the lifting cable 397 is connected to the cable drum wheel 330. The lifting cable 397 is a lifting cable. The lowering cable 398 is similar to the lowering cable 234B, and one end of the lowering cable 398 is connected to the cursor 342B and the other end of the lowering cable 398 is connected to the cable drum wheel 330. ~~The cable 398 is a lowering cable.~~

Please amend paragraph 44 as follows:

The intermediate cable 399 is connected at one end to the cursor 342B and at the other end to the cursor 342A. The intermediate cable 399 is an intermediate cable and acts in a lifting sense by lifting the cursor 342B, and also acts in a lowering sense by lowering the cursor 342A. There are three cable runs 372, 373 and 374, which include semi-rigid tubes 375, 376 and 377, respectively. The cable run 372 intersects the cable run 376373 at point C, and any contact between the cable runs 372 and 376 is prevented by the semi-rigid tubes 375 and 376.

Please amend paragraph 45 as follows:

Once assembled onto the door, the three semi-rigid tubes 375, 376 and 377 can be removed to lighten the assembly and reused. However, the semi-rigid tubes 375, 376 and 378 are inexpensive and light weight and can remain on the assembly if preferred. In particular, where two cable runs 372 and 376373 intersect, it is advantageous to leave at least one semi-rigid tube on the respective cable run to ensure the cable runs 372 and 376373 do not contact and damage each other as a result of "sawing" action as the regulator is operated in use.

Please amend paragraph 46 as follows:

Figure 5 shows another embodiment of a dual lift window regulator cable assembly 414 including components that fulfill substantially the same function as those shown in the dual lift cable assembly 313 and labeled 100 greater. The cable drum wheel 430 is mounted on a plate that has been incorporated into the rigid member 451. The lower pulley wheels 426 and 427 and 426 each include a pair of wheels that rotate in opposite directions. The cable runs 480 and 481 are provided with the semi-rigid tubes 482 and 483.

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Please amend paragraph 47 as follows:

In other embodiments, certain end fittings can be dispensed. For example, the ~~end~~ fittings 266 of the separate plate 252 can be removed, and the semi-rigid tubes 260[[.]] and 261 are extended to contact the cable drum wheel 230. Once assembled onto the door, the semi-rigid tubes 260 and 261 can be removed to allow the cable drum wheel 230 to rotate freely.

Please amend paragraph 51 as follows:

The arcuate guide slot 522 displaces a part of the cable 516 laterally to cause an increase in length of the cable path. In this example, the region 516A is displaced laterally in the direction of arrow C.

Please amend paragraph 53 as follows:

Figure 8 shows a detailed view of the cursor 242 shown schematically in Figure 3. The cursor 242 is guided on a guide rail 630. The lift cable 234A includes an end 632 having a cable nipple 634. The end 632 and the cable nipple 634 are positioned within a housing portion 636 of the cursor 242. A helically wound compression spring 638 in the housing portion 636 biases the cable nipple 634 downwardly relative to the housing portion 636. The tensioning system effectively shortens the length of the lift cable 234A. The lowering cable 234B also includes an end 662 having a cable nipple 664 biased upwardly by ~~the~~ a spring 668 to shorten the length of the lowering cable 234B. In further embodiments, the system used to shorten the cable need not be incorporated in the cursor 242.

Please amend paragraph 54 as follows:

The cursor 242 shown in Figure 8 can be used as the cursor 342A of Figure 4. The wound compression spring 638 provides a tensioning system for the lifting cable 397, and the spring 668 provides a tensioning system for the intermediate cable 399. The cursor 242 of Figure 8 can also be used as the cursor 342B of Figure 4. The wound compression spring 638 acts as a tensioning system for the intermediate cable 399, and the spring 668 acts as a tensioning system for the lowering cable 398.